

Notice of Allowability

Application No.

10/643,967

Examiner

Toniae M. Thomas

Applicant(s)

NANSEI ET AL.

Art Unit

2822



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the RCE filed on 20 January 2006.
2. ☒ The allowed claim(s) is/are 1,3-11,39 and 40.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 11/17/05; 01/20/06
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

Mary Wilczewski
Primary Examiner

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after allowance or after an Office action under *Ex Parte Quayle*, 25 USPQ 74, 453 O.G. 213 (Comm'r Pat. 1935). Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 20 January 2006 has been entered.
2. Currently, claims 1, 3-11, 39, and 40 are pending. Claims 12-38 were cancelled by examiner's amendment as being drawn to an invention nonelected without traverse. See the examiner's amendment attached to the notice of allowance mailed on 17 November 2005.

Information Disclosure Statement

3. The information disclosure statement (IDS) filed 20 January 2006 has not been considered because the references cited therein were previously cited in the IDS filed on 17 November 2005. However, the examiner has considered the IDS filed on 17 November 2005.

Allowable Subject Matter

4. The following is an examiner's statement of reasons for allowance: as stated in notice of allowance mailed on 17 November 2005, the prior art of record does not anticipate or render obvious a method for manufacturing a semiconductor device substantially as claimed. For example, it is known to

form a lower silicon oxide film, form a silicon film on the lower silicon oxide film, and completely nitride the silicon film by a plasma nitriding method, thereby forming a silicon nitride film on the lower silicon oxide film, as evidenced by Weimer (US 2003/0040171 A1). However, the prior art of record does not anticipate, teach or suggest - either separately or combined - a method for manufacturing a semiconductor device substantially as claimed, wherein the method comprises: completely nitriding the silicon film with a surface wave plasma generated by a plasma nitriding method to form the silicon nitride film, and further forming an upper silicon oxide film on the silicon nitride film by a plasma oxidizing method, *as recited in claim 1*; or forming an upper silicon oxide film on the silicon nitride film by a plasma oxidizing method, wherein the plasma oxidizing method forms a gate insulation film composed of only silicon oxide in a peripheral circuit region simultaneously with the upper silicon oxide film, *as recited in claim 40*; or forming the silicon film on the lower silicon oxide film to a thickness of 5 nm or above, *as recited in claim 39*.¹

Admittedly, the Aronowitz et al. patent (Aronowitz) discloses a method for manufacturing a semiconductor device, wherein the method comprises the steps of: forming a lower silicon oxide film 204 (see Fig. 2B and col. 5, lines 25-32); forming a silicon film 206 on the lower silicon oxide film (see Fig. 2C and col. 5, lines 32-38); and plasma nitriding the silicon film (see Fig. 2D and col. 5,

¹ The silicon film has a thickness of less than 30 Å, i.e. 3 nm (par. 24, lines 11- 13).

line 57 - col. 6, line 34).² Nevertheless, Aronowitz does not anticipate, teach or suggest plasma nitriding to completely nitride the silicon film 206, thereby forming a silicon nitride film on the lower silicon oxide film 204. On the contrary, the plasma nitriding method of Aronowitz forms a nitrogen-rich silicon layer on the silicon oxide film 204 (see col. 6, lines 31-53).

Furthermore, there is no teaching or suggestion within the prior art of record to modify Aronowitz by completely nitriding the silicon film.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

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References Cited

The references cited in this Office action are cited only as art of interest. See the PTO-892 Form attached hereto.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:30 p.m.

² The Aronowitz patent was submitted as prior art in the IDS filed on 17 November 2006.

Art Unit: 2822

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TMT
20 February 2006



Mary Wilczewski
Primary Examiner